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ABSTRACT

The success and safety of flight in actual instrument conditions is dependent upon the communicative competency of the individuals involved. The more obvious elements of communication involved include crew coordination and communication both verbal and nonverbal, aircraft and ground communication links, pilot interpretation of verbally and instrumentally derived information, and analysis of the nuances of accepted verbal phraseology. The pilot co-constitutes and maintains the "world" of instrument flight at various levels. This participation emerges as an expressive function as well as a cognitive task. An understanding of the fluidity of performance of certain pilots may be found by examining characteristic aspects that provide the qualitative background of the human experience of instrument flight. Expressive dimensions of communication are an integral part of pilot performance. The presence of the expressive region accounts for the difference noted between the "mechanical" pilots and those who have a "feel" for the aircraft. For the sake of flight safety, it becomes a responsibility to investigate and to attempt to understand how the instrument flight pilot incorporates the technology of flight and of instrumentation with every act of flight, with every thought, expectation, and remembrance. (HOD)

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THE COMMUNICATIVE RELEVANCIES OF INSTRUMENT FLIGHT; A TECHNOLOGICALLY CONTINGENT WORLD

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INTRODUCTION

The success and safety of flight in actual instrument conditions is dependent upon the communicative competency of the individuals involved. The pilot is a social actor contextualized by the technological/human network in which s/he functions. Embedded in an elaborate system, the pilot is called upon to perform by integrating through her/his action, thought, and awareness information derived from a variety of both tacit and direct communication systems.

Instrument flight relies upon an interactive system that requires communicative competency in mutually dependent human and technological domains. Without this system, instrument flight is an impossibility, and without a degree of competence, it becomes a game of chance.

Communicative Aspects

The more obvious elements of communication involved in flight safety include: crew coordination and communication both verbal and nonverbal; aircraft and ground communication links, both verbal and data; pilot interpretation of verbally and instrumentally derived information; and analysis of the nuances of accepted verbal phraseology. With current technological trends the pilot's role seems increasingly to be one of a systems monitor and in this role competency requires analysis of coherence in systems. Yet, in the event of a breakdown, and in flight-critical moments, the need to "hand-fly" the aircraft remains. Of course, for most of general aviation light aircraft "hand-flying" is the only option.

Less obvious are expressive domains that found the previously mentioned communicative events and reveal how the pilot interacts with this world of instrumentation and technologically embodied voices. It is through a qualitative understanding of the contextualized data that sense can be made. (McCoy, 1983) A qualitative approach complements the quantitative measures in use.

THE APPROACH

A qualitative context exists for all distinct communication phenomena, and through this context the question of meaningfulness can be addressed. (McCoy, 1983; Husserl, 1960) A conscious process means something and at the same time the meaning of that phenomena inheres in the consciousness. Conscious experience is relational in nature.

This study presupposes the acceptance of certain tenets of phenomenology and hermeneutics as applied to communication. (McCoy, Experience, 1981, pp. 30-67) Relevant to the discussion of instrument flight communication are: (1) communication as polycentric; (2) communication as multileveled; (3)

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the apriori communicative community; (4) communication as dialogical; (5) the hermeneutic requirement for concretization of the linguistic tradition; and (6) the corporeal nature of communication. (McCoy, Experience, 1981; and see Husserl, 1960, 1970, 1973; Merleau-Ponty, 1968, 1970, 1978; Heidegger, 1962; Apel, 1967, 1980; Gadamer, 1975)

Prior to any reflective self reference the ego is already oriented polycentrically in the field of experience. Each self is a point of reference to the common field of meaning. Phenomenological and eidetic bracketing show that a phenomenon taken at different "levels" is experienced differently. The apriori communicative community indicates that before a given individual can attach meaning to an event s/he already understands that event in terms of an established common language community. The event is already deployed in a meaningful context. By dialogical is meant the originary encounter where perspectives blend at the horizon of the task or text. Phenomena trace across the separate corporieties. The dialogical process unfolds the commonality already present. Hermeneutics further suggests that it is human action and presence in particular moments and situations from which holistic understanding can appear. Interpretation pervades all aspects of evaluation and the use of data must be understood as utilizing qualitative factors whether named or tacit.

Primarily through Merleau-Ponty, the fundamental aspect of the human committedness to situation and world is found to be attunement. Perception is direct communication with world, an encounter with linguistic corporiety that is expressive of a style of comportment. Intercorporeal encounter is upsurgence toward the experiential field from which the other is read and in which all are immersed. In this openness to field for self and other lies the possibility for mutually implicative facticity and meaning, concreteness and essentiality. The immediate, localized situation contains the possibility for meaning beyond its limits. Meaning is the very structure of corporiety, and any experiential event always signifies "more."

The phenomenological question becomes one of the sense-making or significative function of experience. The human being is the nexus of meaningful experience of self and world rather than a subject who has experience or an object component. Meaning integrates rather than connects the human being and technology and is already implicit in the relationship. (McCoy, Context, 1979)

The purpose of this study is to delineate how the expressive/ qualitative aspects that found the later and more apparent elements of communication are at play in instrument flight, and to explore how these expressive aspects affect pilot performance.

INSTRUMENT FLIGHT AND EXPRESSIVE COMPETENCY

Pilot competency ranges from a varying mechanical ability to perform separate tasks in sequence to that of a seemingly total bodily or kinaesthetic response. The question of competence is already an assumption of measurability and performance to a set standard. The definition of competence as used here must include the delimitation of quality. The pilot co-constitutes and maintains the "world" of instrument flight at various levels. This participation emerges as an expressive function as well as a

cognitive task. The pilot embraces a world that utilizes technological instruments with their specific range of possible meanings and relies upon the human interpretation and maintenance of the system. The system is more than the technological components of communication and navigation radios, gyros, radar, or instruments which provide data to the pilot. The "system" is a commonly shared set of expectations about the way the instrument flight world functions.

Flight fluency. A pilot learning the ways of instrument flight is taught the instrument functions, cognitive skills, interpretation of visual data derived from flight instruments, and the syntax and phraseology of flight jargon. The student progresses from a stilted performance of tasks to varying levels of skill. As experience grows, achievement parallels the development of language learning: the student moves from a constant monologue reviewing structures and procedures to fluency. Just as some individuals never attain fluency in a language, some pilots never attain fluidity in instrument flight situations. Regardless of accumulated flight time, these pilots remain "mechanical." Flight instructors, examiners, chief pilots for charter and airlines willingly admit to this difference. To the extent that a pilot is open to this experiential world the range of available options remains open. The pilot who remains embedded in a prior structure will be able to function only rigidly in the new context remaining alien to its needs, just as the student who must continue to translate via a first language fails to attain fluency.

Evaluation. Evaluation of pilot competence relies primarily upon quantitative parameters. For example, the candidate must shoot an approach within a certain number of feet and within so many degrees of deflection, demonstrate knowledge of emergency procedures, and complete written examinations that cover regulations, procedures, and weather. However, the interpretation of the data and the process of evaluation is qualitative. (McCoy, 1983) Additionally, a qualitative evaluation co-exists which notes the style of performance. Two candidates for an instrument rating may prove successful by very different routes. One may accomplish each task in a procedurally appropriate manner yet fail to achieve a fluidity of movement and overall awareness of his/her relative place in the general scheme of things. Another may be capable of integrating the procedural aspects with a general sense of being-at-home in the context.

Just as any socio-historical context shapes an individual, the world of instrument flight carries its own latent possibilities awaiting the actions of the pilot. The pilot assumes the smooth operation of the system and trains for the failure of certain elements. In the breakdown of the instrument world to cohere, the pilot becomes aware of her/his degree of self-investment in this background to the extent required by the current problem. Each human performance concretizes the structure and lends it visibility. An understanding of the fluidity of performance of certain pilots may be found by examining characteristic aspects that provide the qualitative background of the human experience of instrument flight.

The "Thickness of the World": Understanding Qualitative Space

To the pilot flying night IFR, the world disappears and is experienced differently. The night and the clouds are close and full, encompassing the wings and nose of the aircraft, erasing the perspectival world. Only a softly lit cabin provides perspectivity while the illuminated instruments silently speak. To the controller the aircraft moves sector to sector as a radar blip maintaining directional orientation across a screen. While at one level the pilot is clearly aware of her/his position in geographic space, more immediate is the constitution of existence. In the cockpit the aircraft system and configuration instruments, and navigation instruments become the pilot's senses, and the controller's voice sustains the pilot through the dark night.

Merleau-Ponty writes of perception in the night:

> ...the world of clear and articulate objects is abolished, our perceptual being, cut off from its world, evolves a spatiality without things. This is what happens in the night. Night is not an object before me; it enwraps me and infiltrates through all my senses, stifling my recollections and almost destroying my personal identity. I am no longer withdrawn into my perceptual lookout from which I watch the outlines of objects moving by at a distance. Night has no outlines; it is itself in contact with me....it is pure depth without foreground or background, without surfaces and without any distance separating it from me.
>
> (Merleau-Ponty, Perception, p. 238)

Expressive space. The expressive domain through which the instrument pilot functions is primordial and is prior to any objective orientation. This does not mean that s/he lives without objective space. (Stroker, 1965) The demands of the flight with their objectives and orientations, the monitoring and reporting, continue. Neither is this a subjective realm, but lies in the nexus of individual and context. Attuned space is experientially prior to perpsectival space. It is a way of experiencing without measurable distances, without position of place, but is a space that is expressively animated, pre-cognitive. It is a way of being affected and is a region of immediate affinity.

The pilot's odd insulation from daily cares and distractions and his/her intensity of living in the here-and-now allows a greater awareness of attunement with context to emerge. A mood apears not of emptiness nor isolation, but of fullness itself, of being cradled and buoyed up by a supportive world. Identity recedes, while closeness is experienced.

Characteristic of the expressive mode is a primary spatiality of expressive movement with a unique sense of nearness and remoteness. A functionally primary spatiality appears that is without reference to things external to the cockpit. In the prevalent here-and-now mood experiential nearness and remoteness acquire a significant immediacy. "Nearness is of pure presence, lingering here and now or being threatened or beset by things which, by their irritation, intrusion and oppression, leave no 'space' for one's own relations and development." (Stroker, p. 40) Flight crews at

night often maintain silence and any unnecessary comments are resented. Such comments are intrusions that break the communion with the night and its peculiar space.

Movements can be differentiated as expressive or as purposeful depending upon whether or not an action is governed by compulsion. (Stroker, 1965) Taken at the cognitive level, flying an instrument approach can be understood as purposeful and goal oriented. For this reflection is required to locate the body and the manner of its presence in the world. At the same time another type of movement, expressive movement, is present. On a non-precision approach, for example, a pilot fleshes out one possibility among many aware of him/herself in relation to significant points in geographic space and in time. Each space-time configuration and hence each pilot movement realigns the phenomenal field. No two approaches are ever the same. The style with which the oriented movement is performed may be viewed as an appearance of expressive movement in a mutual attunement and harmony of dynamic forms. The shift in focus from one mode to another as primary may induce performance problems. This may be a complicating factor for pilots in addition to the known physiological readjustments who attempt single pilot IFR alternating inside and outside fields of reference.

Phenomenal field. Expressive movement in attuned space refers to the nature of such space being co-constituted by the context and social actor. The space exists for movement and at the same time is made a space through that movement. (Stroker, 1965) This activity, "kinesthesis," is embodied with the body's movement and is co-localized in the movement. (Husserl, Crisis, pp. 216-217)

A phenomenal field is present that is prior to dualities of body and consciousness, subject and object. Each control movement a pilot initiates changes the field, inscribes new lines of force wherein the activity in its turn surges and is realized, once again transforming the field of action. (Merleau-Ponty, 1983) The air is present to the pilot as an immanent dimension of his/her intentions. S/he constitutes a corporeal unity with the field. The individual is in complicity with his/her world.

The pilot experiences fullness, is satiated by flight as by a mistress or a lover. From the union of the phenomenal field arises an ipseity that leads to an existent that narrates and synchronizes multiple significations into a totality. This initial ipseity is an insistence, a unity for itself, "overflowing, involuting, pleasureful." (Lingis, on Levinas)

The phenomenal body is the context, the flesh of the world. The body is always in action and is identical with the orientations of the field. Such is the relationship of the pilot/aircraft and the flight path to be inscribed. The pilot/aircraft is in the phenomenal field that has its own lines of force, its own vectors. The flight gesture intertwines with the whole world and the gesture is that world. The human and world are in upsurgence; thus the very gesture of meaning is identical with the object. The pilot subsumes the aircraft. The pilot "flys" the approach, misses the approach, etc. Expressively the pilot enfolds things, planes, procedures, systems, and incorporates sensibility in him/herself. The aircraft has movement through perspectival space that is conjoined with the expressive movement of pilot unified with the phenomenal field.

Perhaps the relationship of the expressive space and perspectival space may best be understood as a matter of focus. While the expressively attuned is experientially prior to the perspectival, any analysis must be from a perspective and so can only point to the qualitative dimension of flight; that is, the tacit mode may be delineated rather than defined. The greater the extent to which the qualitative visibly emerges in the gesture of flight the more effortless or graceful the action appears. The instrument flight context is a communicative event traced by human behavior.

A fundamental unity is copresent with the more apparent considerations of instrument flight. The senses intercommunicate through openning onto the structure of the perceived thing. One perceives synaesthetically, that is, any one sense carries across all registers. (Merleau-Ponty, 1978) A bodily synthesis takes for granted all latent knowledge the body possesses in a prelogical unit. The world as "cradle of meanings...and ground of all thinking [stands] on the horizon of our life as the primordial unity of all our experiences." (Merleau-Ponty, Perception, p. 430)

Temporalization. The flight gesture establishes a field, the system, and is comprehensible only with that field. In perception, a thing is taken up and the basic structure appears embodied as one of many possible concrete forms. The pilot flys a procedure turn or holding pattern in a unique space-time frame and with a unique style despite the standardized format. With perception appears the temporal mode of the present. The lived world is temporalization. Each lived experience is constituted in consciousness as a form of temporality. (Husserl, Crisis, pp. 216-217; Experience, pp. 253-258) Such temporality is a transcendence in place. The "thickness" of the world is the expressivity of the pilot.

Such an appearance constitutes a logos, or an expression of the world that reveals in it the mutually implicative role of the flight context and the pilot in deploying the phenomena of the instrument-contingent world.

IMPLICATIONS

Expressive dimensions of communication are an integral part of human performance and so of pilot performance. Communicative competency is easily assessed with regard to task oriented evaluation. However, the pilot forms a visible link through whose upsurgence appears facets of the multiplicity of communication. The pilot incorporates the technology of flight and of instrumentation with every act of flight, with every thought, expectation, and remembrance. For the sake of flight safety, it becomes a responsibility to investigate and to attempt to understand how the human being so contextualized functions. This research must explore all possible ways of understanding the instrument pilot. How a problem such as this is approached formatively alters the facts to be explained. (See "theorizing subject effect, "Binswanger, 1963; Giorgi, 1970)

The presence of the expressive region accounts for the difference noted between the "mechanical" pilots and those who have a "feel" for the aircraft. Compare the artist's approach to a blank canvas. One will move to it with paint laden brush, another will pencil sketch first. Actual flight in instrument conditions offers a similar problem. Just as the

canvas and paint provide restrictions as well as a way for expression to occur, the technological and regulatory restrictions provide a media for flight that varies in style with the pilot. Power settings, rates of climbs and descents, degrees of bank, all can be identified but do not account for the style any more than the size of the painter's brush.

Attunement with context suggests that the individual who senses and operates more directly from the phenomenal field may incur less stress from dissonance between actual events and sets of expectations. Less stress in actual emergencies allows the free flow of problem solving attempts which realign the flight context. Just as excellence is recognizable by other pilots, the qualitative difference carries through emergency situations as well. The pilot's ability to recognize a structure that no longer works, as in an emergency procedure, would foster the implementation of alternatives.

Further exploration of the affect of expressivity on pilot performance might include:

1. Design of a test instrument, or identification of an existing psychological instrument, to reliably distinguish "types" of pilots;
2. Initiation of a long-term study to determine relative differences of pilot groups based on these categories given the same training and at equivalent experience levels during their flight careers;
3. Determination of the ability to "tap into" the expressive mode can be learned. Since the expressive is primary to human experience each should have access.
4. Examination of the role of demonstration and "doing" in current flight training as already teaching to a gap in linear quantitative methods.
5. Utilization of training techniques that induce shifts in awareness.

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